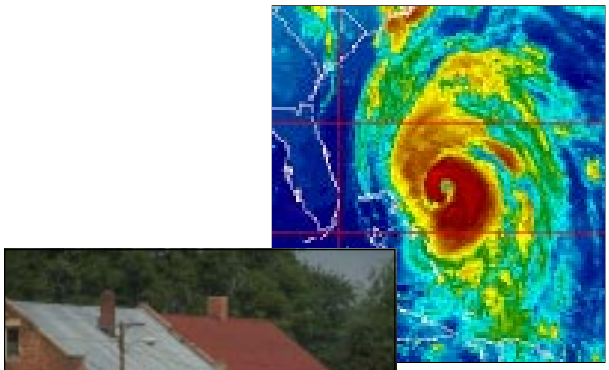
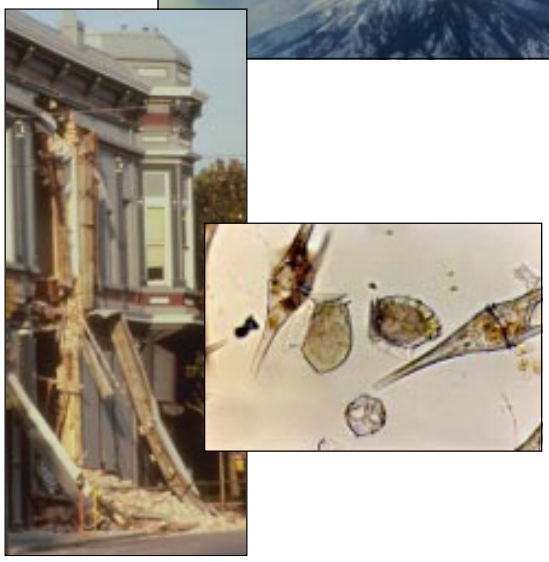
National Environmental Satellite, Data, and Information Service

Hazards Support Activities





Severe weather

hurricanes
thunderstorms
tornadoes
winter storms
heat
droughts
floods

Geophysical activity

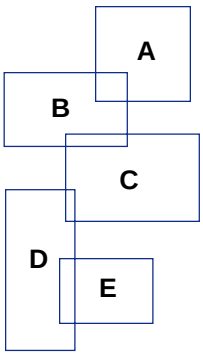
volcanoes
earthquakes
tsunamis

Extreme biological events

harmful algal blooms
nonindigenous species
persistent hypoxia

U.S. Department of Commerce National Oceanic and Atmospheric Administration 1998

Contents



Cover Images:

A. Hurricane Fran, 1996 (NOAA Public Affairs).

B. Floodwaters, St. Genevieve, Missouri, 1993 (Andrea Booher, Federal Emergency Management Agency).

C. Eruption of Mount Saint Helens, Washington, 1980 (NESDIS photo archive).

D. Earthquake damage, Santa Cruz, California, 1989 (NESDIS photo archive).

E. Photomicrograph of harmful algal species (Woods Hole Oceanographic Institution).

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Photo montage, page 11 from the GLOBE Program; page 18 by Janet Ward, NOAA. Publication designed and edited by Joy Ikelman, NOAA/NESDIS.

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Suitland, Maryland 20233 U.S.A.
http://ns.noaa.gov/NESDIS/NESDIS_Home.html

Natural hazards threaten lives, property, natural resources, public health, and the stability of local and regional economies throughout the United States.

In the last few years, weather-related events have caused approximately $1 billion per week in damages.

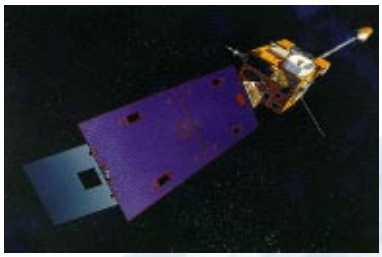
The National Oceanic and Atmospheric Administration (NOAA) is working toward providing the best possible warnings and information about natural hazards. The ultimate goal is to increase the resiliency of people and property before and after hazard events. NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) is pleased to take an active role in this goal.

Satellite Management and Hazards Assessment

NESDIS manages the Nation's operational, environmental satellite system.

NESDIS manages the Geostationary Operational Environmental Satellite (GOES) series, which was first launched in 1975, and the Polar Orbiting Environmental Satellite (POES), which began as the TIROS series in 1960. In 1998, NESDIS took over the operational aspects of the Defense Meteorological Satellite Program (DMSP). Data from these environmental satellites are used in a variety of hazards assessment activities.

GOES satellite.



Geostationary Satellites. GOES satellites provide continuous monitoring of Earth's atmosphere and surface over a large region of the Western Hemisphere. These satellites monitor potentially severe weather conditions such as tornadoes, flash floods, hail storms, and hurricanes.

Imagery is used to estimate rainfall during thunderstorms and hurricanes for flash flood warnings, as well as to estimate snowfall accumulations, overall extent of snow cover, and movement of ice fields. Infrared channels on today's GOES satellites can help to detect forest fires, fog formation, and volcanic plumes.

NESDIS provides real-time satellite imagery on the World Wide Web at http://www.goes.noaa.gov. In addition, NESDIS provides a data collection service for *in situ* GOES observations. This service supports for land management, reservoir management, river forecasts, water quality monitoring, fire potential, navigation, irrigation control, seismic activity, tsunami warnings, and solar-environmental conditions.

POES satellite.

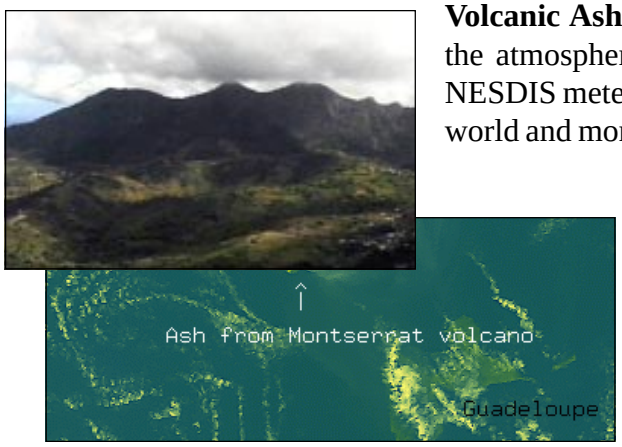
Polar-Orbiting Satellites. Data from the POES series support a broad range of environmental monitoring applications including weather analysis and forecasting, climate research and prediction, sea surface temperature measurements, atmospheric soundings of temperature and humidity, ocean dynamics research, volcanic eruption monitoring, drought and forest fire detection, vegetation analysis, ice shelf assessment, and many other applications. (Online searches, data, and images are found at http://www.saa.noaa.gov.)

DMSP satellite.

POES satellites fly the Argos Data Collection System, which collects discrete, *in situ* observations. The data support atmospheric and ocean analyses, forecasting, and research. Much of the data collected is available through the Global Telecommunications System of the World Meteorological Organization.

NESDIS also archives data from the Defense Meteorological Satellite Program (DMSP), processing data collected from three meteorological sensors on board each satellite. DMSP data have been used to monitor and assess global wildfire activity, population dynamics, and carbon dioxide emissions. (Information about DMSP data may be found at http://www.ngdc.noaa.gov/dmsp/.)

Detecting and Forecasting Hazards Events

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VOLCANIC ASH ADVISORY STATEMENT
ISSUED 1930 UTC 05 MAR 1998 BY THE
   WASHINGTON VAAC
SOUFRIERE HILLS 98-264 WEST INDIES 16.7N 62.2W
SOURCES OF INFORMATION: GOES-8 VISIBLE
   AND INFRARED AND MULTISPECTRAL IMAGERY.
1200 UTC GUADELOUPE SOUNDING.
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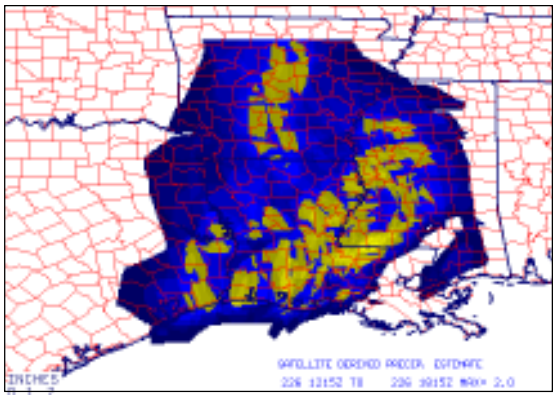
Example of a partial Volcanic Ash Advisory Statement for Soufriere Hills Volcano, Montserrat, March 5, 1998. (Photo of Soufriere Hills by J.W. Ewert, U.S. Geological Survey, 1996; NOAA AVHRR data, February 1998.)

Volcanic Ash Advisory Statements. Ash plumes injected into the atmosphere pose dangers to aircraft flying through them. NESDIS meteorologists track volcanic eruptions throughout the world and monitor all available satellite images for ash plumes.

Volcanic Ash Advisory Statements are issued by NESDIS; these may include text messages plus graphic interpretations. Using numerical model data, an outlook Volcanic Ash Forecast Transport and Dispersion is produced by the National Weather Service. This information is provided to the Federal Aviation Administration, U.S. Geological Survey, to climate analysts, and to scientists in other countries.

Precipitation Estimates. NESDIS sends out Satellite Precipitation Estimate messages alerting area forecast offices whenever satellite imagery indicates the occurrence of heavy precipitation. Composites of 24-hour rainfall are created in digital and graphic form, and posted on the Web.



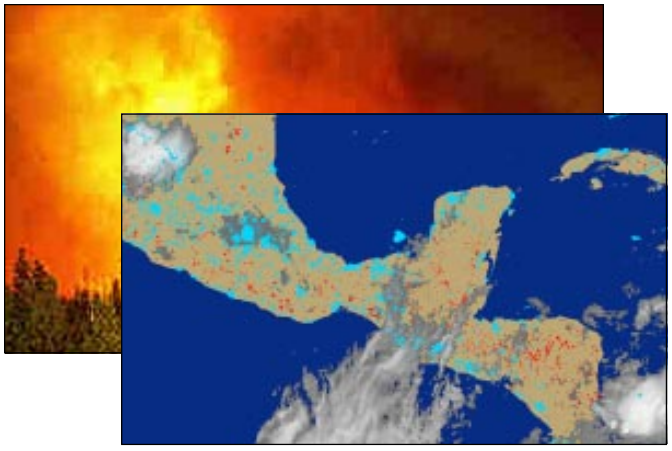
Example of precipitation estimate for the Gulf Coast region. Bright yellow areas indicate higher levels of precipitation.

Wind Monitoring. Satellite-derived wind images are generated by NESDIS using infrared and water vapor imagery from GOES-8 and GOES-9 satellites. These are used in numerical models by the National Weather Service. Text messages provide information for selected cities in North America.

Tropical Storm Monitoring. Tropical storms put thousands of people at risk from flooding, high winds, and tidal surge. Satellites have significantly improved the lead time for tropical storm forecasting. While NOAA's National Hurricane Center in Miami is responsible for tracking hurricanes along the U.S. mainland, NESDIS is watching the tropics in all areas of the world. NESDIS coordinates satellite interpretations of tropical system strength and position with other NOAA facilities. NESDIS meteorologists release informational messages every six hours for tropical cyclones in the West Pacific, South Pacific, and Indian Oceans.

Data from environmental satellites are used in assessing, detecting, and forecasting severe weather and other natural hazards.

Wildfire Detection. Wildfires pose serious hazards to human populations and to natural resources. Wildfire detection is done by NESDIS scientists using satellite technology. The GOES satellites provide frequent updates, day or night, based on multispectral imagery. The Advanced Very High Resolution Radiometer on polar-orbiting satellites records aerosol optical thickness (which measures smoke). The DMSP Operational Linescan System (OLS) has the capability to detect fires at night in a light-intensified visible channel. NESDIS scientists produce images of fires observed by OLS, adding geographic references such as shorelines or country boundaries.



NESDIS fire image from DMSP data, May 20, 1998. Red spots indicate fire locations. During 1998, smoke from fires in Mexico and Central America was carried long distances by wind currents. (Background photo from the National Interagency Fire Center.)

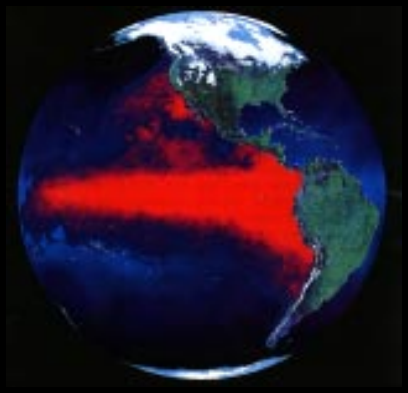
El Niño and La Niña.

El Niño is a disruption of the ocean-atmosphere system in the tropical Pacific. It can result in significant changes in weather patterns worldwide. As El Niño fades, it is typically replaced by its mirror opposite, La Niña.

Many parts of NOAA are involved in research, assessment, monitoring, and prediction of these phenomena. NESDIS scientists develop products from satellite-derived observations of sea surface temperatures and climate anomalies.

NESDIS also creates charts depicting regions of potential coral reef bleaching related to the increased sea surface temperatures of El Niño. Ocean color studies assess the effect of El Niño on the biology and chemistry of ocean waters, such as harmful or unusual blooms of algae or other plant life, and ocean turbidity.

Other NESDIS satellite products with relevance to El Niño forecasting are monthly mean rainfall charts, ocean surface winds, and outgoing radiation and aerosols.



Composite of NOAA's satellite views of El Niño, 1997–1998. (NOAA Public Affairs.)

NESDIS applies information technology to hazards response.

Responding to Natural Hazards Events

Special Events Notification. A NESDIS team of satellite scientists and meteorologists monitor disaster-related events such as fires, floods, oil spills, snow storms, tropical storms, and volcanic activity. Using imagery from NOAA satellites, the team creates overlays, analyzes, annotates, and provides descriptive narratives. These materials are announced within hours of the hazards event, and are available for viewing on the World Wide Web at http://www.osei.noaa.gov.

Search and Rescue Satellite Aided Tracking (Sarsat). Cospas-Sarsat is an international, humanitarian search and rescue system that uses satellites to detect and locate emergency beacons carried by ships, aircraft, or individuals. The system has been used extensively during weather emergencies, especially for locating craft disabled by severe storms. The system consists of a network of satellites, ground stations, mission control centers, and rescue coordination centers across the planet.

The Sarsat packages are carried on the NOAA Polar Orbiting Environmental Satellites. (Cospas packages are carried by the Russian NADEZHDA navigation satellites.) The United States Mission Control Center, operated by NESDIS, serves as the focal point of United States' Cospas-Sarsat

alert data. These data are forwarded to the U.S. Air Force and Coast Guard. To date, more than 8,000 lives have been saved by Cospas-Sarsat. The program runs 24 hours a day, every day of the year.

The Global Disaster Information Network. The Global Disaster Information Network (GDIN), an interagency effort, is now in the development phase. Work has begun on a national level, and will be extended globally. The ultimate goal is to create an effective network of early warning, mitigation, and response systems of value to all nations, at many levels of technology.

GDIN will assist in natural and technological disasters as well as complex humanitarian emergencies. NESDIS has been well represented in the initial phases of planning and continues to offer its unique experience to the process of establishing the Network.

Earthquake damage, San Francisco, October 1989. (NESDIS photo archive.)

Mitigating Natural Hazards

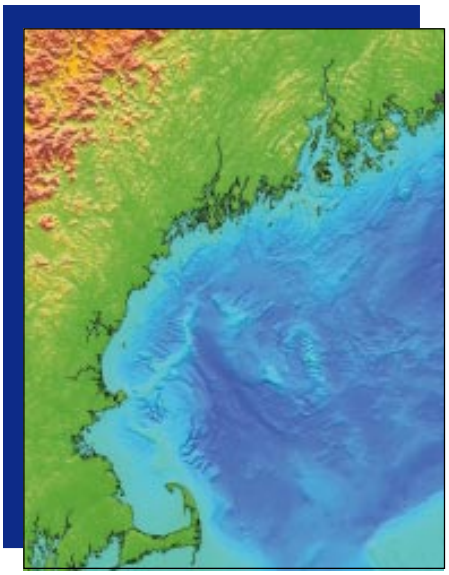
Planning for the possibility of natural hazards is critical, especially in geographic areas with an historically high risk of floods, earthquakes, and severe storms. Traditionally, local governments have emergency response teams or committees which draft hazard response plans after considering data, statistics, or environmental indicators. NESDIS data and analyses are used in these mitigation efforts.

NESDIS provides timely, relevant data and information which can be used during all phases of natural hazards planning and management.

Coastal Hazards. In coastal regions, environmental data are often required to track hazards such as harmful algal blooms, oil spills, pollution, unusual river discharges, and species disintegration. NESDIS works with coastal planners to mitigate the impacts of coastal hazards on public health, living marine resources, and coastal habitats.

Coastal Characterization Models. NESDIS has pioneered ecological characterization techniques which are now being used by coastal zone managers and local agencies. These multi-layered analyses provide a more complete picture of the hazards risk than methods of the past. The models may be used in monitoring harmful algal blooms—some of which have caused near collapse of

NOAA's environmental stewardship mission includes building sustainable fisheries, recovering protected species, and sustaining healthy coasts. (NOAA photo archive.)



Coastal digital elevation models (DEMs) combine land elevations with bathymetry. This image shows the Atlantic Coast, north of Cape Cod, Massachusetts.

ecosystems. The models are also useful in measuring regional hypoxia (coastal dead zones).

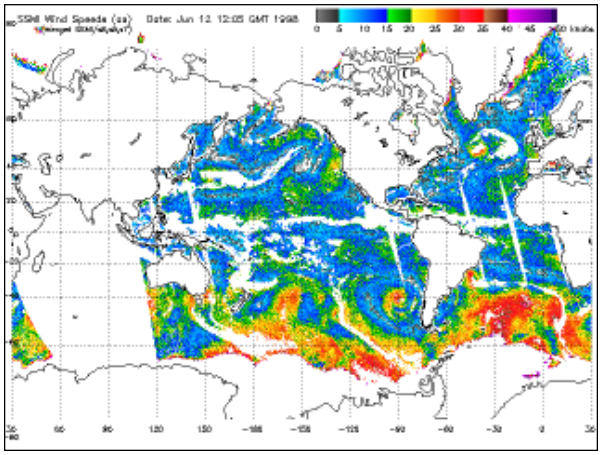
Coastal Relief Models. NESDIS is generating integrated coastal relief models of topography and bathymetry across shorelines at 3 arc-second latitude and longitude resolution. Earlier topography and bathymetry data extended only to the shoreline and stopped. These models are essential for understanding coastal processes. The relief models may also be used for predicting storm surges, tsunamis, and oil spill trajectories.

Coastal Sea Floor Data. NESDIS provides online searches of geophysical data from the coastal sea floor. These data, in combination with relief models, may be used in pollution studies and fish habitat assessment.

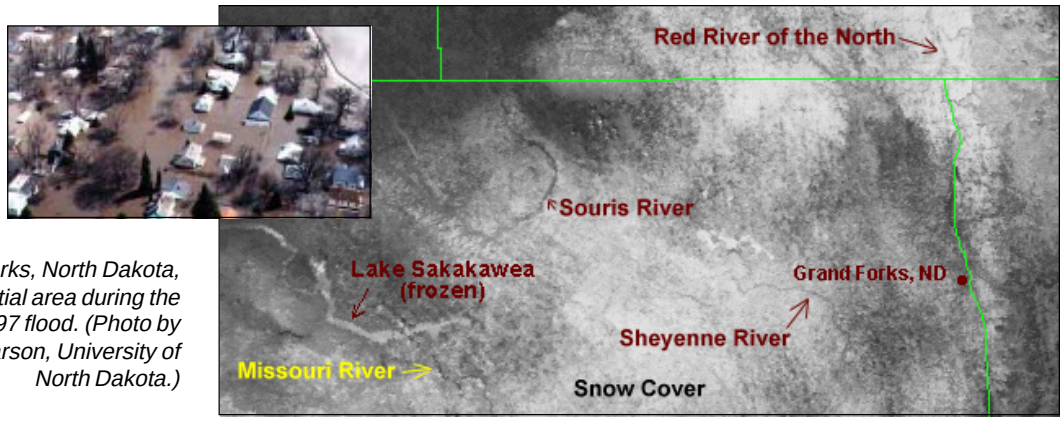
CoastWatch Program. NOAA's CoastWatch Program provides data from environmental buoys to Federal and local marine scientists and coastal resource managers. These data include wind, wave, and other marine data.

Great Lakes Bathymetry. NESDIS, other NOAA components, and the Canadian Hydrographic Service are compiling new Great Lakes bathymetry. NESDIS is also collecting existing geological and geophysical data for the Great Lakes. These data, when used in tandem, are critical in decision making which affects almost 80 million people in the region. Coastal planners use this information for environmental hazards guidelines, species balance, safe navigation, and flooding mitigation.

Satellite Data for Coasts and Oceans. Routine environmental analyses are provided to coastal planners and other environmental users. NESDIS schedules and distributes real-time satellite imagery products and global vegetation index data from operational and research satellites.



Ocean surface winds maps are derived from Special Sensor Microwave/Imager radiometers. Ocean properties data may be applied to physical and biological models, models of ocean circulation, and fisheries resources.



Grand Forks, North Dakota, residential area during the April 1997 flood. (Photo by Richard Larson, University of North Dakota.)

Northern Plains, April 12, 1997. The Red River broke the 100-year flood crest record on April 17, 1997. (NOAA-14 AVHRR Visible Channel.)

Weather Hazards. Information on daily or long-term regional weather may help in the budgeting of resources from sand bags to snow plows. Emergency agencies depend on these historical data to assess the need for equipment, supplies, and shelter space, and to coordinate volunteer activity.

Hurricane Activity. NESDIS posts online, weekly summaries of hurricane activity and extended range forecasts of Atlantic seasonal hurricanes. The data come from the GOES, POES, and DMSP data archives, maintained by NESDIS. NESDIS also maintains a century-scale data set of tropical cyclone tracks.

Droughts and Floods. Precipitation data to 15-minute time resolution are collected daily from thousands of weather stations.

NEXRAD radar tower. Level II and III NEXRAD data, archived by NESDIS, are useful for regional weather analyses. (NOAA photo archive.)

Radar Products. The Next Generation Weather Radar (NEXRAD) system is comprised of approximately 160 weather surveillance sites throughout the U.S. and selected non-U.S. locations. Each site captures meteorological base data such as reflectivity, mean radial velocity, and spectrum width. These are known as Level II data. From these data, Level III data—meteorological analysis products—are created. Level II and Level III data are archived by NESDIS. Radar products are invaluable for providing meteorological and ground truth data for regional planners.

Aircraft Products. Data reports from thousands of commercial aviation flights are collected monthly. These include pressure altitude, temperature, wind direction, and wind speed. These are a primary source of weather information in between surface reporting points, providing valuable input to the National Weather Service Aviation Forecast program.

Snow and Ice Analysis. Northern Hemisphere Snow and Ice Charts have been produced weekly since 1966. Since 1997, daily analyses have been produced. These are compiled from satellite data and surface imagery.

Collapse of the I-5 and SR-14 interchange, Northridge, California, earthquake of 1994. (NESDIS photo archive.)

Seismological Hazards. Seismological hazards, including earthquakes and tsunamis, affect both coastal and inland areas. NESDIS plays a major role in post-event data collection.

Earthquake Data. Determination of high seismic risk is critical for pre-planning and emergency response. NESDIS provides earthquake data searches to researchers, engineers, insurance companies, civil defense agencies, and to other groups directly related to natural hazards planning. NGDC scientists also take an active role in international forums on earthquake prediction and mitigation.

Tsunami Data. NESDIS has taken the lead in collecting valuable historical data for the Pacific Rim and most recently, for the Caribbean. These data have been used for local flood mitigation planning, and for establishing regional emergency response guidelines.

The Natural Hazards Data Resources Directory is a cooperative effort between NESDIS and the University of Colorado. The directory is organized by natural hazard topics and hazards-related organizations. The information was originally in publication form and now is available on the Web. The *Directory* is used by hazards specialists, planners, and emergency agencies around the world. (Go to http://www.ngdc.noaa.gov/seg/hazard/)

Educating about Natural Hazards

http://ns.noaa.gov/NESDIS/NESDIS_Home.html

Informational pages
earthquakes, tsunamis
snow and ice
severe weather events
Science dictionaries
Descriptive photos and diagrams
earthquake damage photos
damage to coastal areas
hazards assessment
Images from satellites
hurricanes, thunderstorms, snowstorms, fires, droughts
Satellite movies of weather events
hurricanes, tropical storms

Resources for Learning. The Web has become a major source of information on natural hazards for students of all ages. NESDIS uses Web technology to simplify access of hazards data and information. Interactive data mapping and charting teaches about hazards hot spots and trends. Students can view on-line images from GOES and POES satellites to track the movement of severe storms. They can plot earthquake data and see pictures of earthquake events.

NESDIS printed publications continue to be a valuable resource for learning. Monthly journals describe local climatological data, storm data, and unusual weather phenomena. Historical compilations provide a record of seismological events, such as tsunamis and earthquakes. The publications often include easy-to-understand charts, photographs, illustrations, and narratives.

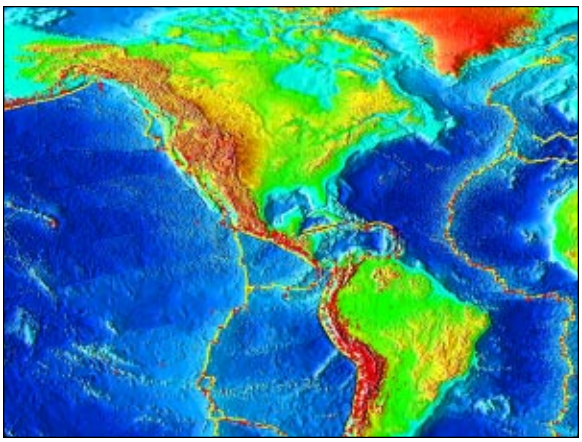
Maps and posters from NESDIS are popular choices for schools and community programs. Slide sets about hurricanes, earthquakes, volcanoes, and tsunamis teach the basics of natural hazards, and provide a colorful introduction for all ages.

NESDIS data and products are used in schools and emergency management training programs.

Outreach Programs. One-on-one contact with local communities is an effective way to educate about natural hazards. NESDIS employees across the country participate in cooperative programs with schools and regional planning agencies. Presentations about earthquakes and volcanoes are very popular; images from the hazards slides sets are used to teach about geological hazards. NESDIS satellite images and videos are used to explain weather systems and forecasting.

NESDIS is also pleased to be part of the *Global Learning and Observations to Benefit the Environment (GLOBE) Program.* GLOBE brings together students, teachers, and scientists from around the world. Teachers guide their students through learning activities about the environment, and teach the basics of data collection. Using the Internet, students send their data to the GLOBE Student Data Archives and use these for studies of past and present climate. NESDIS technical advisors work closely with the GLOBE program.

Media Coverage. Newspapers, television, and museums have drawn on NESDIS expertise and data for educating the public about natural hazards. NESDIS images have been featured in documentaries, in museum interpretive programs, and on magazine covers. NESDIS scientists have been interviewed for news programs and documentaries. This outreach has made hazards support at NOAA/NESDIS more visible, and familiarizes citizens with activities at their Federal agencies.



Map of tectonic plates and epicenters, created from NESDIS data. NESDIS has publications, slide sets, and Web resources which teach about natural hazards.

Managing Natural Hazards Data

NESDIS manages the largest collection of atmospheric, geophysical, and oceanographic data in the world. Many of the data collections are directly applicable to hazards studies.

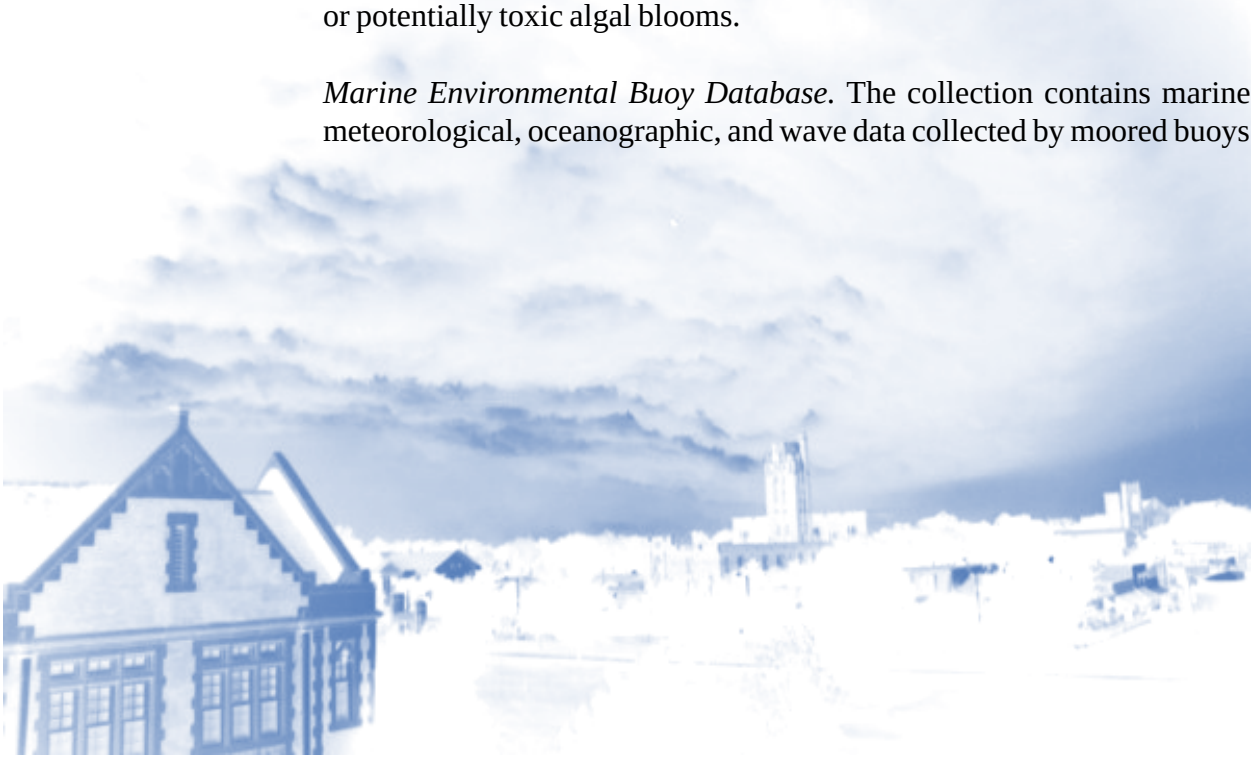
Archiving the Historical Record. The NESDIS data collections are extensive in scope. Long-term data can be used to establish the past record of natural hazard event occurrences, with an eye toward the future.

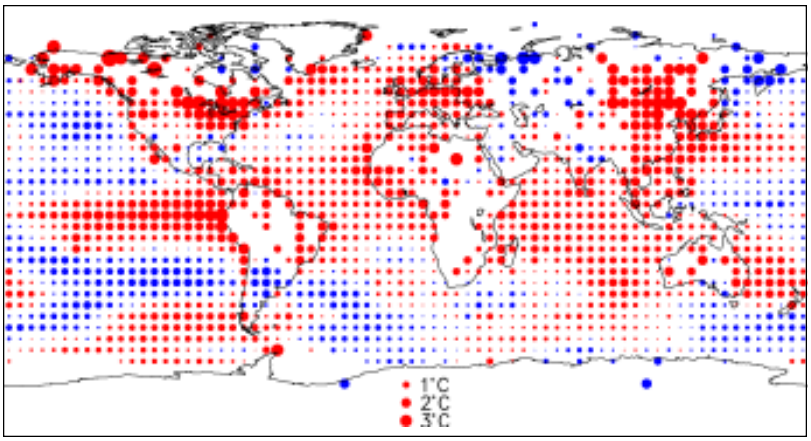
Climate Observation Data. Historical climate observations may include those from land, ocean, and atmosphere. Original data come from many sources—from handwritten log books to satellite output in digital form. NESDIS has extensive collections of these data, useful for climate and ecological hazards research.

Geomagnetic Data. Geomagnetic storms develop when masses of highly energetic, charged particles are ejected from the Sun and, subsequently, hit Earth's magnetic field. These events may be severe enough to upset delicate technological systems on satellites and on the ground, causing interruption of communications and electric power. Data are available for study of this unusual natural hazard.

Historical Oceanographic Profile Data. These are repetitive data samples along ocean sections or at fixed stations for long time periods. Data include temperature, salinity, density, and nutrient data. Global ocean temperature and salinity profiles, 1900–1990, are also available. The data provide critical baseline information for identifying conditions which may lead to hypoxia or potentially toxic algal blooms.

Marine Environmental Buoy Database. The collection contains marine meteorological, oceanographic, and wave data collected by moored buoys





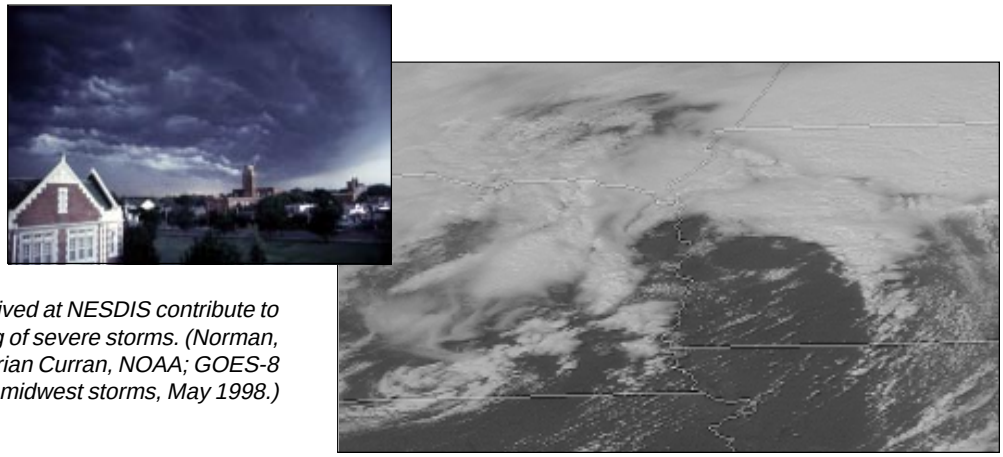
This preliminary map shows global temperature anomalies, January–May, 1998. The blue dots show cool anomalies, and the red show warm anomalies. The size of the dot is proportional to the magnitude of the anomaly.

The land data are from NESDIS' Global Historical Climatology Network. Satellite, ship, and buoy data were used for the ocean areas. NESDIS has extensive collections of scientific data which may be used for climate analyses.

and network stations operated by the NOAA National Data Buoy Center. Data also include air temperature and pressure, wind speed and direction, wind gust, sea surface temperature, wave height, wave period, and wave spectra.

Paleoclimate Data. Valuable clues to past climate are buried in sediments at the bottom of the oceans, locked in coral reefs, frozen in glaciers and ice caps, or preserved in the rings of trees. Paleoflood indicators can be used to analyze the full range of extreme flooding that has occurred in specific regions. NESDIS scientists are using these base data to create models of possible future climates.

Satellite Data Archives. NESDIS archives real-time and historical satellite data from its geostationary and polar-orbiting satellites. The archive includes data in digital form, and thousands of photos of storms, tropical cyclones, and daily weather. Access systems allow users to search NESDIS satellite data inventories, preview sub-sampled images, and download the actual data for processing and analyses.



Satellite images archived at NESDIS contribute to the understanding of severe storms. (Norman, Oklahoma, photo by Brian Curran, NOAA; GOES-8 image, U.S. midwest storms, May 1998.)

The satellite image product at right shows enhanced infrared imagery from GOES-10, March 20, 1998. The image is centered over Georgia during the time a tornado was on the ground. Eleven people were killed; damage to property was extensive. (Damage to house in Georgia; photo by Bill Reckert, FEMA.)

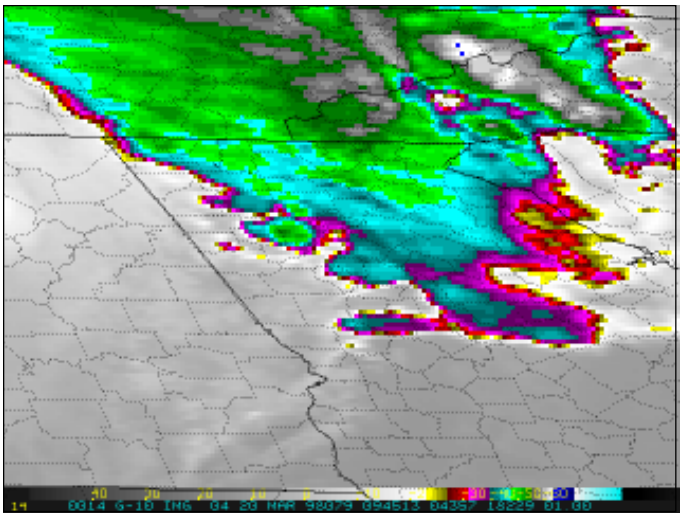
Seismicity Data. The NESDIS seismicity data base now contains nearly five million listed events. Data are added weekly from regional sources, keeping the data base current within several days of the earthquake event. The data base includes accelerograph records, earthquake intensity, seismological algorithms, and tsunami data. Historical photographs and publications are also available.

Snow and Ice Data. Snowfall totals and ice storm data are used in historical weather analyses. These are particularly useful for local and regional studies. NESDIS also provides snow data sets from data-sparse areas, for the purpose of remote sensing algorithm validation.

Solar Database. The NESDIS Solar Database is part of a cross-disciplinary effort within NOAA to link observed changes on the Sun with terrestrial climate. Data include sunspot numbers from 1700, coronal observations, cosmic rays, solar flares, and solar irradiance.

U.S. Weather Disasters, 1980–1997. The U.S. has experienced some very expensive weather-related disasters over the past 18 years. Twenty-five of these disasters occurred during the 1988–1997 period with total costs of $150 billion. Data are available in digital and publication format.

World Ocean Atlas. NESDIS is working with the NOAA Climate and Global Change Program to produce compilations of world ocean data. Work to date includes quality control of historical *in situ* temperature, salinity, oxygen, phosphate, nitrate and silicate data, and the preparation of one-degree latitude-longitude mean fields for each of these parameters.



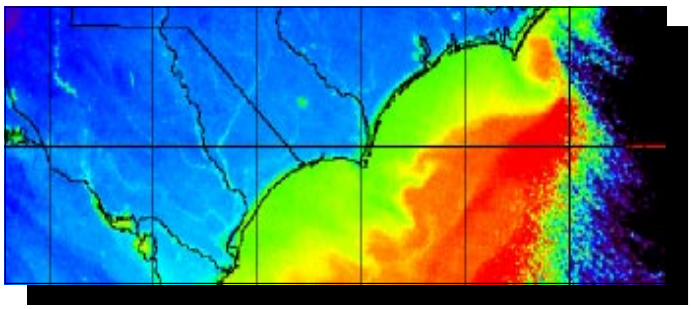
Creative technology from NESDIS enhances natural hazards data utilization.

Creating and Sharing Technology. NESDIS data software products and systems enhance data utilization at several levels—from the data manager who organizes and distributes data to the end user who views and analyzes the data. The data management techniques recognize the importance of associating metadata (documentation, articles, captions, definitions) with the data.

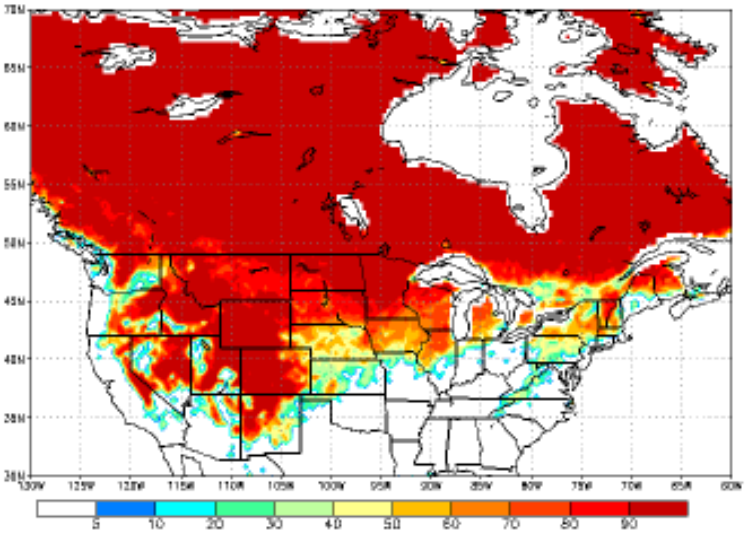
Web technology is being adapted by NESDIS computer experts for easy display and use of hazards data. For example, NESDIS is working with the international Committee on Earth Observation Satellites (CEOS) to establish a disaster information server on the Web, utilizing satellite technologies for disaster management, mitigation, and recovery. (See http://www.ceos.noaa.gov.)

High-resolution digital satellite data analysis and display system workstations, created by NESDIS scientists, have been introduced into National Weather Service offices. These are used to study weather phenomenon and forecasting.

Creative use of geographic information systems technology, combined with NOAA satellite data and historical records, have led to breakthroughs in hazards assessment, detection, and forecasting.



Sea Surface Temperature (SST) map of the southeastern U.S. coast, derived from AVHRR data. SST imagery has been used to study El Niño. It is also used in biomass and ecological studies.



Snow cover map derived from Special Sensor Microwave/Imager data. This image was dynamically generated on the Web with user-defined parameters.

NESDIS distributes natural hazards data and information in many formats.

Distributing Data and Information. The NOAA National Data Centers provide access to many of the extensive data holdings of NESDIS. The Data Centers have extensive historical data collections—indexed, archived, and searchable—for those doing studies on natural hazards. Data are received from a wide variety of sources, nationally and internationally. Platforms include satellites, ground observations, aircraft, ships, and weather balloons.

The Data Centers respond to requests from all over the world. There are many forms of hazards data and information dissemination: CDs, disks, magnetic tapes, publications, atlases, maps, posters, printouts, paper copies of original records, microfiche, microfilm, movie loops, photographs, slide sets, electronic mail, telephone, facsimile, and personal visit.

Current NNDC products are featured through the Online Store at http://www.nndc.noaa.gov

Online features include down-loadable data, data searches, graphical user interfaces, satellite products, and real-time satellite imagery. Dynamically-generated Web pages provide data display options tailored for the user.

NESDIS works diligently to distribute timely hazards data and information to emergency managers, educators, scientists, and the public. Information technology continues to transform the data distribution process, allowing quicker access to data essential to natural hazards research and mitigation.

Out of Harm's Way

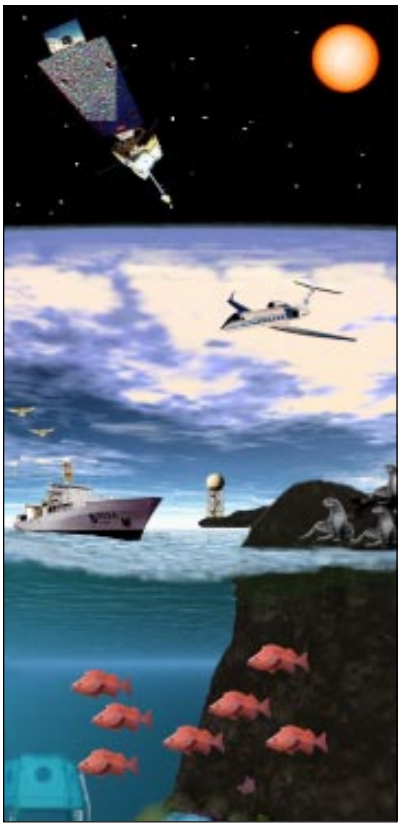
On March 3, 1998, U.S. Department of Commerce Secretary William M. Daley announced the **Natural Disaster Reduction Initiative** (NDRI). NDRI is an interagency effort to reduce and mitigate the direct and indirect costs of natural disasters. The NDRI will:

- improve building construction techniques to resist weather, seismic, and fire disasters
- improve prediction of damaging weather and related river flooding
- help communities and businesses safeguard jobs in hazard-prone areas

The costs of natural hazards are projected to increase if steps are not taken to help communities reduce their vulnerability and prevent natural hazards from becoming uncontrolled disasters. While we cannot control the forces of nature and the devastations they cause, we can do three things: move out of harm's way, keep out of harm's way, and promote long-term recovery. NESDIS programs will continue to be an important element in reaching these goals.

Hurricane Linda, September 12, 1997. (GOES-9, Channel 1, 3, 4)

"The Commerce Department's Natural Disaster Reduction Initiative will help save lives and protect property. We will be working closely with FEMA, the Interior Department and other Federal agencies, with state and local governments and with our nation's businesses."
William M. Daley, Secretary of Commerce



NESDIS Contacts

Web sites are accessible through the NESDIS home page at:
http://ns.noaa.gov/NESDIS/NESDIS_Home.html

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